

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION**

ORDER NO: 93-046

SITE CLEANUP REQUIREMENTS FOR:

UNOCAL REFINING AND MARKETING DIVISION
UNOCAL CORPORATION, SAN FRANCISCO REFINERY
RODEO, CONTRA COSTA COUNTY

The California Regional Water Quality Control Board, San Francisco Bay Region (hereinafter called the Board) finds that:

1. Unocal Corporation, (hereafter Union Oil or the discharger), owns and operates the San Francisco Refinery located at Rodeo, Contra Costa County as shown in Figure 1. The refinery produces fuels and lubricants and is classified as a lube refinery as defined by U.S. Environmental Protection Agency in 40 CFR 419.40. Daily crude throughput consists of approximately 80,000 barrels of oil. The refinery began operations at this location in 1896.
2. The site is in a flat floored valley lying between Crockett and Rodeo, adjacent to San Pablo Bay. The valley drains an area of approximately 1,100 acres, of which approximately 40% is occupied by the refinery. Interstate Highway I-80 separates the main refinery facilities from the southern, mainly undeveloped portion of the site. Elevations range from 700 feet to sea level. The refinery is located on a northwestern plunging asymmetrical syncline comprised of interbedded silty sandstone, siltstone and claystone of upper Miocene age.
3. Waste Discharge Requirements, Order No.89-180 and Environmental Protection Agency (EPA) Administrative Order No. RCRA 09-89-0012 prescribed subsurface investigations for hydrocarbon contamination and metals. The Orders required an evaluation to determine whether hydrocarbon contaminants are impacting ground or surface waters of the State. A report titled "Hydrocarbon Investigation Report, Unocal San Francisco Refinery" was submitted in September 1992. The objectives of the investigation/remediation program are:
 - a. Investigation of potential off-site contaminant migration pathways located near the perimeter of the refinery.
 - b. Investigation of the interior areas of the refinery (e.g above ground storage tanks with a history of bottom failures, or areas suspect of hydrocarbon contamination - source areas.

- c. Monitoring of groundwater quality at potential contaminant migration pathways near the perimeter of the refinery.
 - d. Control of groundwater quality at potential contaminant migration pathways near the refinery perimeter.
 - e. Remediation of contaminant source areas in the interior of the refinery.
4. Hydrocarbon contamination is widespread in the western portion of the refinery adjacent to San Pablo Bay, particularly in the "A" zone wells monitoring the water table aquifer. Investigations conducted in late 1988 and early 1989 showed the presence of 5 floating hydrocarbon pools containing approximately 44,000 barrels of oil. Corrective measures along much of the bay front are warranted to control migration of hydrocarbons and metals into San Pablo Bay.
5. Two distinct aquifers are present over part of the area bordering the bay. The A zone which occurs mostly within fill and the B zone which occurs in bay sand overlain by bay mud, separating it from the A zone. The bay sands and mud occur in the western part of the site. Bay mud extends several hundred feet inland from the bay shore. The bay mud serves as an aquitard but does not overlie the bay sand completely. Contaminated groundwater migrating from the interior of the site may enter the bay sand at locations not overlain by bay mud and migrate into San Pablo Bay. Several incorrectly installed monitoring wells connect the A and B zones. The vertical gradient present accelerates migration of contaminants from the A to the B zone. Floating and dissolved hydrocarbons were found to be more widespread in the A zone than the B zone.
6. Bay mud is absent in the northern part of the bay front in the vicinity of the marine terminal where fill directly overlies the bay sand. The aerial extent of bay mud is restricted to the vicinity of the shoreline, whereas bay sand is found to be present further inland, allowing contaminants to enter the bay sand and migrate into San Pablo Bay, beneath the bay mud.
7. Previous investigations have shown the presence of floating oil pools close to the bay front and on both the up/and downgradient sides of the P. G. & E. channel, which is underlain by bay sand. Floating contaminants in the A zone and dissolved contaminants in the B zone from these oil pools may be migrating into the bay both in the A zone and within the bay sand of the B zone.
8. A tidal influence study was conducted in 7 wells, 4 in paired A and B zone monitoring wells located adjacent to the Effluent

Safety Basin. Change of potentiometric surface elevation was noted in wells completed in the bay sand (B zone) of the paired wells along the bay front, without increase in chloride content. This indicates that bay waters are not intruding into bay sand and the fluctuations are the result of tidal pressure effects.

9. Floating petroleum hydrocarbons (FPH) and dissolved-phase hydrocarbons were present downgradient of inactive waste sites 5 and 8 in both the A and B zones. Distribution of floating hydrocarbons was more extensive in the A zone than the B zone wells. A large floating hydrocarbon pool is present in the vicinity of these two waste sites. Inactive waste site 5 was used for the disposal of leaded tank bottom sludges, while site 8 was used for the disposal of acidic sludges. Waste constituents consist of both FPH and dissolved products, metals, semi-volatile and volatile organics and acidic residues. The groundwater flow direction is towards San Pablo Bay.
10. The refinery site of Unocal Corporation is divided by Highway 101 into two parcels. The western portion of the site is the location of the refinery, the Upper and Lower Tank Farms, three Hazardous Waste Disposal Sites and several large floating oil pools, located in the near vicinity of the shoreline of San Pablo Bay. This Order focuses primarily on development of plans to prevent migration of floating and dissolved hydrocarbons and dissolved metals in groundwater, on the western portion of the refinery, from entering San Pablo Bay.
11. The Environmental Protection Agency (EPA) under its Proceedings of the Resource Conservation and Recovery Act, which was incorporated into the land treatment area Post Closure Permit, has initiated an Ecological Risk Study, to be completed by May 15, 1993. Based on this study Unocal will prepare a Corrective Measures Study Work Plan for completion by June 12, 1993. This document will describe a work plan to develop a specific corrective measures program to prevent migration of wastes into State waters.
12. The Board adopted a revised Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) on December 11, 1991. The Basin Plan contains water quality objectives and beneficial uses for San Francisco Bay and contiguous surface and groundwaters.
13. The actual or potential beneficial uses of San Pablo Bay in the vicinity of the site are:
 - a. Industrial service supply
 - b. Navigation

- c. Commercial and sport fishing
 - d. Contact and non-contact water recreation
 - e. Wildlife and estuarine habitat
 - f. Fish migration and spawning
 - g. Preservation of rare and endangered species
 - h. Shellfish harvesting
 - i. Migratory water fowl resting and feeding area
- 14. The discharge of waste constituents creates or threatens to create a condition of pollution or nuisance.
 - 15. These Site Cleanup Requirements are written to direct the discharger to take necessary measures to prevent or remediate migration of waste constituents into San Pablo Bay.
 - 16. This action is an Order to enforce the laws and regulations administered by the Board. This action is categorically exempt from the provisions of CEQA pursuant to Section 15321 of Title 14, of the California Code of Regulations.
 - 17. The Board has notified the discharger and interested agencies and persons of its intent under California Water Code Section 13304 to prescribe Site Cleanup Requirements for the discharge and has provided them with the opportunity for a public hearing and an opportunity to submit their written views and recommendations.
 - 18. The Board in a public meeting, heard and considered all comments pertaining to the discharge.

IT IS HEREBY ORDERED, pursuant to Section 13304 of the California Water Code, that Unocal Corporation shall cleanup and abate the migration of wastes into San Pablo Bay as follows:

A. PROHIBITIONS

- 1. The discharge of wastes or hazardous materials in a manner that degrades water quality or adversely affects the beneficial uses of the waters of the State is prohibited.
- 2. Further significant migration of pollutants through subsurface transport to waters of the State is prohibited.
- 3. Activities associated with remediation of subsurface transport of contaminants and cleanup which will cause significant adverse migration of pollutants are prohibited.

B. SPECIFICATIONS

1. The storage, handling, treatment or disposal of soil or groundwater containing pollutants shall not create a nuisance as defined in Section 13050(m) of the California Water Code.
2. The discharger shall conduct investigations and monitoring activities as needed to further define the current local hydrogeologic conditions, and the lateral and vertical extent of soil and groundwater pollution. Should monitoring results show evidence of pollutant migration, additional characterization of pollutant extent may be required.
3. The discharger's submittal of technical reports evaluating immediate, interim and final remedial measures will include projection of the cost, effectiveness, benefits, impact on public health, welfare and environment of each alternative measure. The reports shall consider the State Water Resources Control Board's Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California".

C. PROVISIONS

1. The discharger shall comply with the Prohibitions and Specifications of this Order in accordance with the following tasks and time schedules.
2. The discharger shall comply with Prohibitions A.1., 2. and 3., and Specifications B.1. and 2., according to the following schedule:

COMPLETION DATE/TASK

- a. CORRECTIVE MEASURES STUDY WORK PLAN
COMPLETION DATE: June 12, 1993

Submit a technical report, acceptable to the Executive Officer, containing a Corrective Measures Study Work Plan to define a corrective measures program to prevent migration of polluted groundwater into San Pablo Bay. Technologies to be investigated shall include a groundwater intercept system at the western boundary of the site and source control measures to reduce the discharge of contaminants to groundwater from sites 5 and 8 (an acid sludge disposal site and leaded tank bottom disposal pit). The study shall also analyze the impact of groundwater extraction and treatment on flow and contaminant mass discharge to the Bay from the site.

b. SUPPLEMENTARY ACTIONS WORK PLAN
COMPLETION DATE: July 16, 1993

Submit a technical report, acceptable to the Executive Officer, containing:

- (1) a proposal to improve delineation of pollution extent by installing additional monitoring wells at the Seasonal Products Storage Tank Farm, downgradient of tank 1002, located in the southeastern part of the site. Evaluate the extent of subsurface unleaded gasoline, to initiate recovery if present in sufficient quantity.
- (2) a work plan to develop a FPH recovery system in the vicinity of inactive waste sites 2 and 3 at the Upper Tank Farm.
- (3) a work plan to perform an assessment of the acceptability of existing monitoring wells for use in both monitoring of water quality and the measurement of the groundwater surface and piezometers at the periphery of the site. The evaluation must include justification for acceptability or abandonment of wells. Show all wells that may serve as interconnection between the "A" and "B" zones. The report should be accompanied by a map at scalable dimensions showing all wells of questionable construction and completion, which will be abandoned.
- (4) Install no less than 2 additional monitoring wells at the Lower Tank Farm to delineate the extent of the FPH. Develop a work plan to recover FPH if recovery is determined to be feasible.

c. CORRECTIVE MEASURES PLAN
COMPLETION DATE: December 15, 1993

Submit a technical report acceptable to the Executive Officer documenting the results of the Corrective Measures Study and proposes a specific implementation plan and time schedule.

d. SUPPLEMENTARY ACTIONS REPORT
COMPLETION DATE: September 30, 1993

Submit a technical report acceptable to the

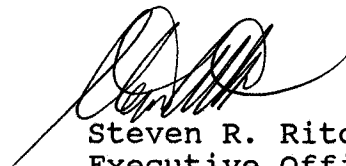
Executive Officer detailing completion of work performed as identified under Provisions C.2.b., including a floating petroleum hydrocarbon recovery plan and implementation time schedule for the Oil Pools and sites 2 and 3.

3. The discharger shall file with the Board quarterly self monitoring reports performed in accordance with any self-monitoring program issued by the Executive Officer.
4. Copies of all correspondence, reports and documents pertaining to this work program shall be provided to the following agency:

United States Environmental Protection Agency
Region IX, 75 Hawthorne Street
San Francisco, CA 94105-3901

5. The discharger shall permit the Board or its authorized representative, in accordance with Section 13267 (c) of the California Water Code, the following:
 - (1) Entry upon premises in which any pollution sources exist, or in which any required records are kept, which are relevant to this Order;
 - (2) Access to copy any records required to be kept under the terms and conditions of this Order;
 - (3) Inspection of any monitoring equipment, methodology or site, implemented in response to this Order; and
 - (4) Sampling of any groundwater or soil which is accessible, or may become accessible, as part of any investigation or remedial action program undertaken by the discharger.

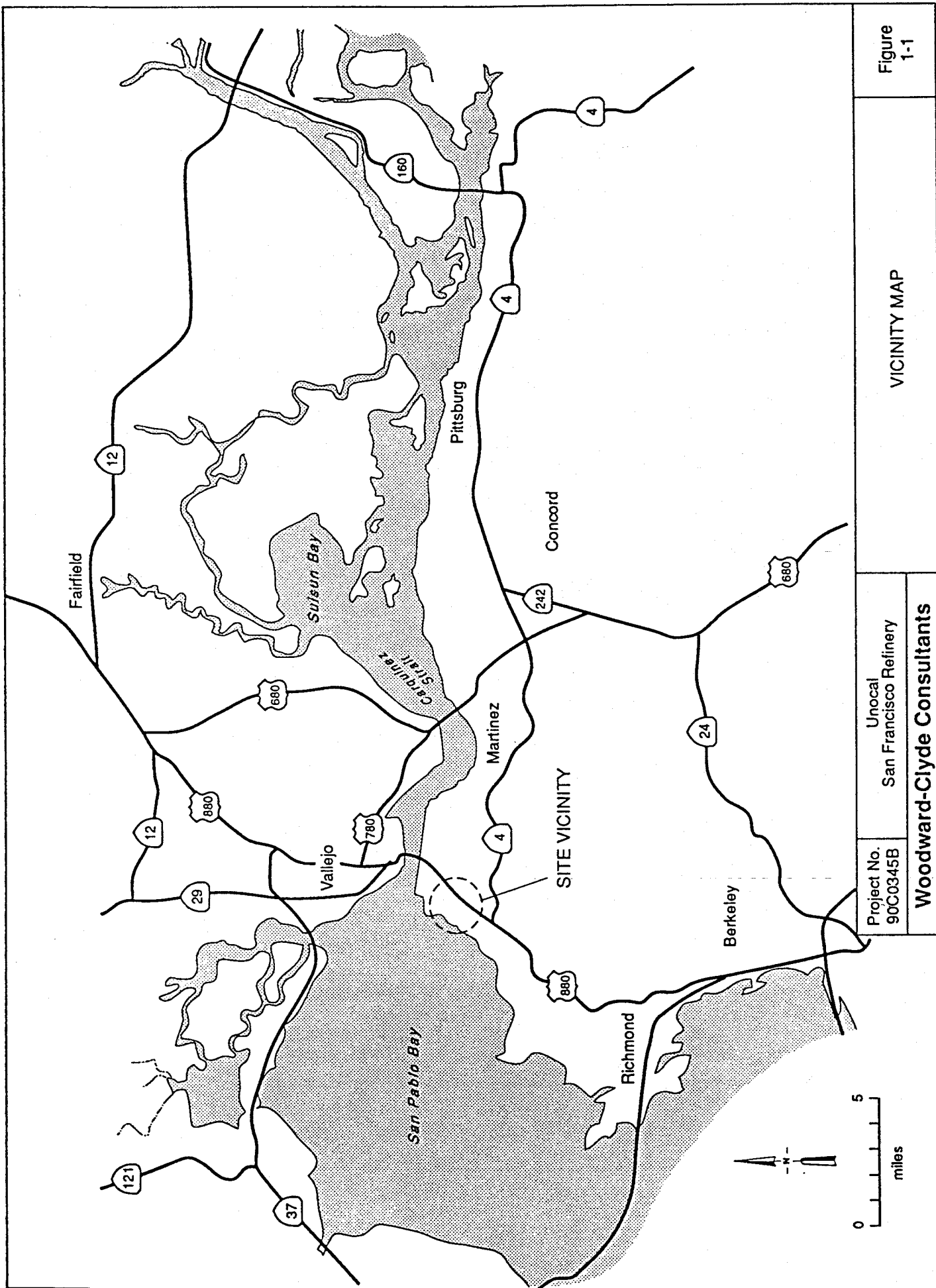
I Steven R. Ritchie, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region on May 19, 1993.



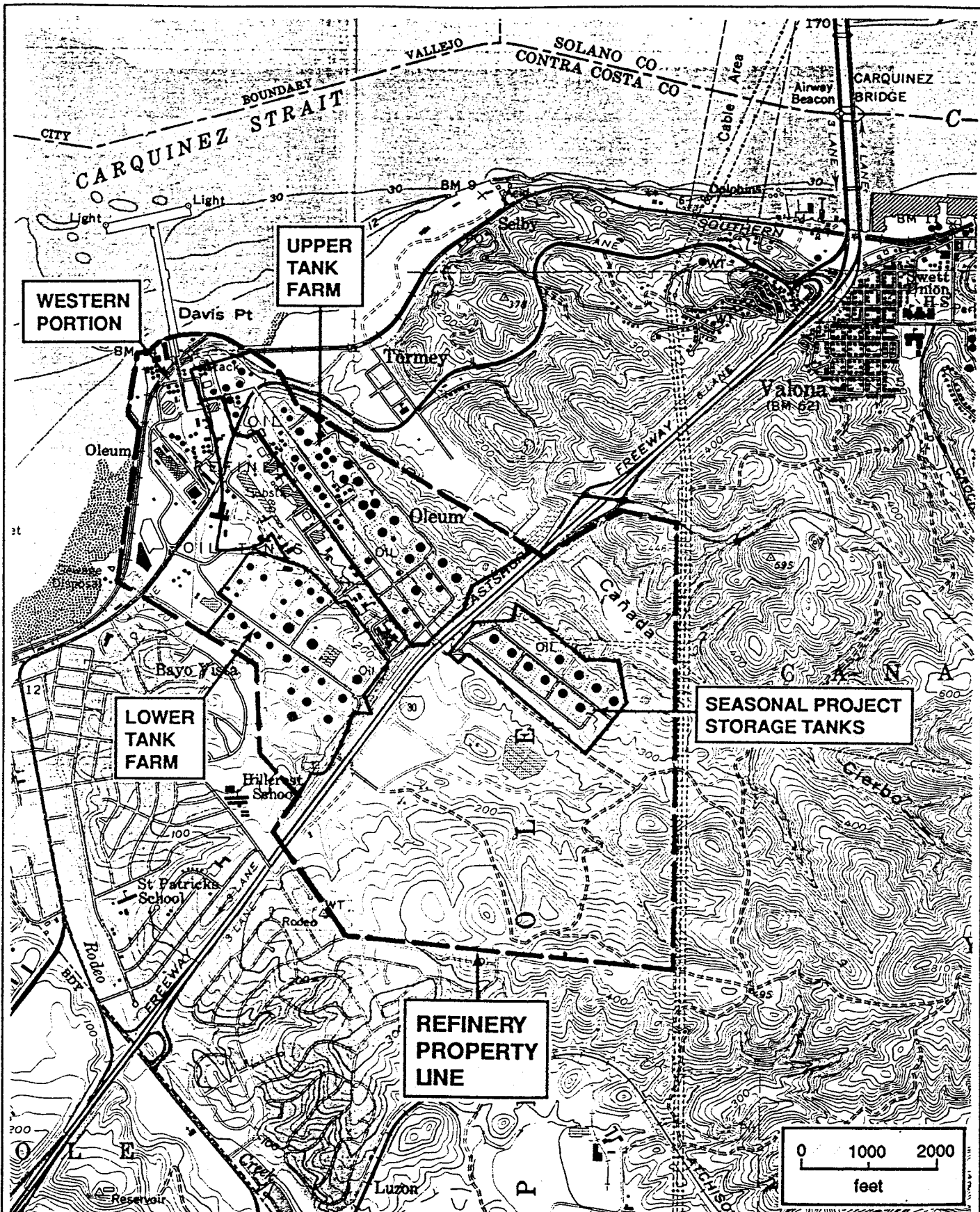
Steven R. Ritchie
Executive Office

Attachments:

1. Site Location Map
2. Site Map



Project No. 90C0345B		Unocal San Francisco Refinery	VICINITY MAP	Figure 1-1
Woodward-Clyde Consultants				



Project No.
90C0345B

Unocal Waste Sites Investigation

Woodward-Clyde Consultants

SITE LOCATION MAP

Figure
1-2